DOCUMENT RESUME

ED 152 048 EC 110 046

AUTHOR Lowell, Edgar L.; And Others
TITLE A Search for Performatives in Young Deaf Children. Final Report.
INSTITUTION John Tracy Clinic, Los Angeles, Calif.
SPONS AGENCY Spencer Foundation, Chicago, Ill.
PUB DATE Apr 77
NOTE 79p.

EDRS PRICE MF-$0.83 HC-$4.67 Plus Postage.
DESCRIPTORS *Aurally Handicapped; *Communication Skills; Early Childhood Education; Exceptional Child Research; *Language Development; Language Patterns; *Nonverbal Communication; Semantics; *Verbal Communication

ABSTRACT

Described is a study in which videotape recordings of the language of 11 hearing impared children (2-4 years old) were analyzed according to 16 pragmatic and 13 semantic functions. Findings are presented for the following study aspects: reliability of coding, effects of degree of hearing loss and intervention, oral communicative behavior, nonverbal communicative behavior, combined verbal and nonverbal behavior, individual behavior, and comparisons with hearing children. Among implications discussed are the following findings: the number of communicative acts per minute which a child produces increased with age; hearing impaired Ss lagged behind hearing children in the acquisition of verbal semantic functions, although the hearing impaired Ss progressed more according to the norm for pragmatic than semantic functions; and degree of hearing loss and age of subject together predicted fairly well the number of semantic and pragmatic verbal functions. (CL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED152043

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

A SEARCH FOR PERFORMATIVES IN YOUNG DEAF CHILDREN*

FINAL REPORT
April 1977

Edgar L. Lowell
Susan Curtiss
Tina L. Bennett
Carol Prutting
Carol Rouin
Anne Dunlea

JOHN TRACY CLINIC

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Edgar L. Lowell

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

*THIS RESEARCH WAS SUPPORTED BY A GRANT FROM THE SPENCER FOUNDATION.

I. Objectives, Procedures, and Data

A. The purpose of this research project was to better understand the development of communication in young deaf children, particularly as compared to development in hearing children. We hoped to be able to isolate significant trends in development, as well as variables affecting the trends; and to draw if possible some conclusions regarding the implications of our findings for teaching and assessment of communication in hearing impaired children.

The approach we have utilized to meet the above objectives has been taken from the child language research of the past five years and adapted to meet our needs. We draw heavily on the work of Greenfield and Smith (1976) and John Dore (1973, 1974), and have tried to capture the total communicative ability of the children in our study. This means we have examined both (1) verbal communication (language proper), and (2) nonverbal communication; and have tried to determine (3) the semantic content of the communication and (4) the pragmatic content. In addition, we have tried to discover any significant relationships among the parameters. Thus, we have been able to capture the total communicative abilities of our subjects, beyond their purely linguistic abilities.

B. Procedures

Videotape recordings were made of a sample of children enrolled in the John Tracy Clinic Demonstration Nursery School and in the Clinic's 6-week Summer School Program. The Summer School students live outside the Los Angeles area. They may have had previous educational experience at some other center, but are only enrolled in the Clinic program for six weeks. They were included so that the data would not totally reflect the educational program of the Clinic. The recordings were made on a Sony 1/2 inch Portapak and later transferred to a 3/4 inch Sony cassette tape because the cassette permitted easier reviewing of the tape for coding purposes. The videotaping varied in length of time, depending upon the duration of different activities the children were engaged in. An attempt was made to balance the tapings between out-of-doors free play activities and teacher directed indoor activities. An attempt was also made to alternate between closeups of the individual child and wider shots which permitted the recorders to observe the total context in which the behavior was occurring. It was our experience that the children soon became accustomed to the videotaping and did not appear to be paying undue attention to the camera.

The data (over twelve hours of videotape) were analyzed by college work-study students to determine the semantic and pragmatic content of communicative behaviors, among other things (see Section C). The semantic content of an act could fall under one of thirteen new types of semantic functions, revised in October 1976 from an older set of ten categories which had been in use from May 1 until their revision. The pragmatic functions number sixteen. Analysis of both functions is necessary because in addition to a communicative act's expressing propositions or parts of propositions, it also expresses a communicative intention; that is, a communicator also expresses how he or she intends the utterance (or communicative act) to be taken (the illocutionary force, or what we are calling pragmatics). Thus, in saying the words "John left," the speaker is not only predicating an act (leaving) of a referent (John), but he or she may in addition be answering the question "Did somebody leave?" or "Who left?"; or describing an event; or giving a secret sign for some activity to begin; or making a joke; and so forth. These are communicative intentions. Similarly, when a child, for example, points to himself and to a photograph of himself, he is indicating semantically an object associated with a person (namely himself), although pragmatically he may be responding to a command or question, describing a state of affairs, and so on. These are the types of communicative behaviors we have tried to capture.

Our functions, pragmatic and semantic, are described as follows (where an "act" is an utterance, gesture, body movement, facial expression, or vocalization):

1. Pragmatic functions

Demand	- A request for an action or an object (e.g. "I want glue;" "More juice.").
Command	- An imperative ("Look at me;" "Come here.").
Question	- A request for information or elaboration (e.g. "Who?" "What?" "Huh?").
Labelling	- Identification of a person, object, or action (e.g. "That's a chair;" "Here's Jose.").

Response to a question	- An act directly following a question posed to the child (e.g. head shake, change of topic, an answer to the question).
Response to a summons	- An act directly following a summons for the child's attention (e.g. head turn, eye contact).
Response to a command	- An act directly following an imperative or request issued to the child (e.g. child follows directions, child changes topic).
Imitation (general)	- An imitation of an act or utterance performed by someone else.
Imitation (repetition)	- An imitation of a child's own act or utterance.
Summons	- A request/demand for attention (e.g. a wave, tap on the arm, calling out someone's name).
Description	- An act describing an event, a person, or an object (e.g. "He's tall;" "It fell down.").
Protesting	- An act expressing resistance (e.g. "No," vehement head shake, physical resistance).
Ritual	- A greeting, or other social ritual (e.g. "hi," "bye-bye").
Request for approval	- An act requesting approval from another person (e.g. "Is it O.K. for me to do this?" "Was that all right?").
Request for Confirmation or Acknowledgment	- An act requesting another person to confirm or acknowledge the child's behavior (e.g. "Do you understand?" "Did you hear me?")
Acknowledgment	- An act evidencing comprehension of a situation, event, or message.

2. Semantic functions

Performative	- Utterances, gestures, or vocalizations (acts) which occur as part of a child's actions (e.g. 'bye-bye' and waving) routines ("Pat-a-cake") or any gesture or utterance without specified semantic content.
Locate/Name	- An act pointing out and/or naming (e.g. child points to a dog and says "doggie"). (Greenfield's indicative object) Named object or person must be present.
Volitional Object	- An act focusing on (through gesture) or expressing (through word) the object of a demand only.
Agent	- An act focusing on or expressing the actor (instigator) of an action (e.g. pointing to Stevie if Stevie pushed David; saying "Stevie" in same situation). The agent will be animate.
Action or state of an agent	- An act focusing on (and/or expressing) the action of an agent (e.g. someone's eating and the child says, "eat;" Leslie is painting and Gina says "paint;" Stevie is climbing down from a high place and says, "down"). It is the use of gesture or word to communicate about <u>what someone is doing</u> (or becoming).
Action or state of an object	- A gesture or utterance focusing on or expressing what is happening to an object (e.g. If Stevie throws a spoon down on the floor and says, "Down;: if Leslie turns the light on and Gina says, "On"). It is the use of the word or gesture to talk about <u>what is happening</u> (or has happened) <u>to something</u> (or the state it has reached due to someone's action).

Object	- An act focusing on the object of an action always inanimate; (e.g. Stevie throws a ball and says, "ball;" Gina is drinking milk and Leslie says, "milk;" somebody turns on a light and David says, "light").
Dative	- An act focusing on the recipient or experiencer of an action - always animate (e.g. Stevie kicks David and says, "David;" Tommy gives a book to his mother and says, "Mama").
Object associated with another object or location	- An act focusing on an object (usually not present) which is being associated with or linked to an object which is present (e.g. pointing to a glass and saying, "milk;" pointing to a tree and saying, "bird;" pointing to a foot and saying, "shoe;" putting a paper on one's head and saying, "hat").
Person associated with an object or location (possession)	- An act focusing on a person in connection with an object (e.g. "mine;" Leslie points to Gina's painting and says, "Gina;" Alyssa points to her mother's hat and says, "Mommy").
Locative	- An act expressing or focusing on the location of an object or person (e.g. Stevie puts the ball on the chair and says, "on chair" or "chair;" a bird flies up in a tree and a child says, "tree").
Aspect (of an event)	- An expression modifying a whole event (e.g. "more;" "all done;" "all gone;" "again"). In many instances an aspectual marking of an action or event.
Negation	- An act expressing rejection, denial, nonexistence, refusal or other negative functions (e.g. "I won't!"; "No!"; "Don't!"; head shake; "It's not here.").

C. Data

This section contains information on the sample of children used in the study, information on the reliability of the coding, a summary of the total data.

1. The Sample

The children upon whom this study is based are four two-year-olds, four three-year-olds, and three four-year-olds. In addition, one child is under two, but has been included with the set of two-year-olds. All of the children have some form of hearing impairment, from mild loss to profound deafness, but are otherwise normal.

For some of the children in the study, the experience at John Tracy Clinic represented the first active educational experience; for others, various forms of previous schooling had been available. In addition, some of the children were enrolled in the four-year Day Nursery School program at John Tracy Clinic, and others attended only Summer School. Table A presents each subject, the date of birth, age during the study, mental age (where available), and degree of hearing loss and intervention.

Because these children are hearing impaired, not all of them have begun to speak, as have most children of similar age who have no hearing impairment. For this reason, we have divided the subjects into "verbal" and "nonverbal" groups, as well as age groups, for certain studies. The children in the "verbal" group are those who have used oral language to communicate at least once during the study.

(Insert Table A)

2. Reliability

Reliability of coding was a major concern of this study. The nature of the data was such that inferences regarding the communicative intentions of certain acts could only be inferred from a careful viewing of the context in which the behavior took place and the antecedent and consequent behaviors. Because the children were hearing impaired and because of the location of the microphone on our recording equipment, some of the verbal behavior was not completely intelligible.

TABLE A

Children in the Study

Child	Birthdate	Age in Study	Mental Age	Intervention	Aided Response	Unaided Loss
A.B.	9/19/73	2,9 - 2,10	2,5 - 4+	1 hr./week from Oct. 1975; John Tracy Clinic Summer School (SS) from 6/76	A-B	Hard of hearing
J.H.	7/20/74	1,11 - 2,1	23 - 27 mos.	1-1/2 hr./week private tutor; S.S.	B	Severely deaf
M.H.	9/13/74	1,9 - 1,10	19 - 23 mos.	1 hr./week at a Speech and Hearing Center from Aug. 1975; S.S.	B-C	Profoundly deaf

NB: "Unaided loss" indicates a classification of hearing loss based on pure tone audiologic examination. "Aided response" refers to the level at which a child, with the hearing aid on, is aware of speech.

The guidelines for classification of unaided hearing loss which we used are as follows (where, e.g., 10 to 20 dB means 10 to 20 dB loss):

mild hearing loss - 25 to 40 dB in the better ear.
hard of hearing - 45 to 70 dB in the better ear.
borderline severely hard of hearing/severely deaf - 75 to 85 dB.
severely deaf - 90 to 100 dB in the better ear.
profoundly deaf - 105 to no response.

The guidelines for aided response are as follows:

A = responds at level below 35 to 40 dB.
B = responds at level below 45 to 70 dB.
C = responds at level below 80 - 85 dB.
D = responds at level below 95 - 100 dB.
E = responds only above 100 dB or not at all.

TABLE A (Cont'd)

Child	Birthdate	Age in Study	Mental Age	Intervention	Aided Response	Unaided Loss
A.H.	10/17/73	2,0 - 2,5	Not available	John Tracy Clinic Day Nursery School (D.N.S.)	A-B	Severely hard of hearing/ severely deaf
D.M.	9/13/73	2,0 - 2,6	(at 18 mos.) 9-24 mos. (variable development)	D.N.S.	E	Profoundly dea
A.Ba.	9/20/72	3,0 - 3,6	(at 20 mos.) 24 to 36 mos.	D.N.S. since 9/74 (age two)	A-B?	RE - mild to moderate LE - profoundly deaf
D.H.	9/7/72	3,0 - 3,6	Not available, but apparently at or above age level	D.N.S. since 9/74 (age two)	A?	RE - severely deaf LE - profoundly deaf
A.S.	3/30/73	3,2 - 3,3	Not available	1 hr./week tutoring in a Speech and Hearing Center; S.S.	B-C	Profoundly dea
J.W.	2/17/73	3,4 - 3,5	From 3-4 yr. range through 5 years	1-1/2 hr./week private tutoring; S.S.	A	Severely hard of hearing to severely deaf
A.L.	7/16/71	4,11 - 5,0	5,0 - 5+	4 weeks in Canadian School for the Deaf; S.S.	A-B	Hard of hearin to profoundly deaf
L.G.	10/2/71	4,0 - 4,6	to 5,3	Clinic involvement since 1972; D.N.S. since 1973 (age 2)	B	RE - profoundly deaf LE - severely profoundly deaf

TABLE A (Cont'd)

Child	Birthdate	Age in Study	Mental Age	Intervention	Aided Response	Unaided Loss
N.V.	4/29/72	4,2 - 4,3	Not available	5 mos. of weekly tutoring in a hearing nursery school prior to S.S. enrollment in 6/76	A	Sharply sloping moderate-to-severely hard of hearing

The reliability study was designed to capture the variation in the interpretation of categories which is expected to occur between viewers. Each taped episode was viewed first by a team of two trained college students who first identified a behavior as communicative and then categorized it according to communicative intention (Pragmatics) and semantic content (Semantics). The college student coders were trained by one of the senior investigators (SC) primarily by viewing tapes that had already been coded and which presented clear examples of the various categories. The students had no prior training or college courses in linguistics, yet found the coding relatively easy to learn. The team also noted if the behavior was coded verbally or nonverbally; whether the subject was initiating a communication or responding to one; and finally whether the interaction was between the subject and an adult, the subject and another child or if it was a self-directed communication. When the episode was completely coded, the coding transcription was filed and another fully trained college student, who did not have access to the original transcription, viewed the tape and coded it according to the procedure described above. We refer to this as the (interobserver) reliability check.

When two complete transcripts were available, the original and the reliability check, a tally of all of the disagreements between the two transcripts was compiled. Ultimately a final copy was made in which any disagreements were resolved through the combined efforts of the original team, the reliability coder and the linguists (Research Associate or Research Assistant).

The reliability data reported herein represents a corpus of material viewed only between October 1976 and March 1977; that is, material which was first analyzed after the final revision of categories and after all training of the staff was completed. It consists of 7 hours, 18 minutes, and 5 seconds of film in which 755 communicative behaviors were analyzed. These behaviors encoded 868 pragmatic functions and 949 semantic functions as categorized in the final copies.

a. Agreement on communicative acts

The interobserver reliability data showed 81.5% agreement on communicative acts; that is, the team of two coders and the single reliability coder were in disagreement about the presence or absence of a communica-

tive act in 140 cases. About one-half of these were ultimately resolved to be communicative but were not included in the final report. Also, there were 22 behaviors (2.9%) which were impossible to interpret because they were inaudible or the tape was not clear.

b. Agreement on pragmatic categories

There was 85.5% agreement on the 868 pragmatic categories. The interobserver disagreements are shown on Figure 1.

c. Agreement on semantic categories

There was 91% agreement on the 949 semantic categories. Figure 2 shows the interobserver disagreements on the semantic categories.

d. Agreement on other classifications

There was 98.2% interobserver agreement on whether a communicative act was initiated by the child or was a response to another person and 100% agreement on a behavior as to whether it was verbal or nonverbal, and 100% on whether the interaction was with an adult, another child or the self.

These results are similar to the interobserver reliability test in the Greenfield and Smith study (1976) on semantic classification. (There was no pragmatic classification.) A sample representing 15% of the total corpus of isolated one-word utterances was used to compare independent sets of semantic classifications made by Greenfield and a second judge. The average agreement for all categories was 87.6%.[1]

Brown (1973) points out that it is important to decide how finely categories should be distinguished. This is particularly crucial for categories which are theoretically distinguishable yet closely related. The kinds of categorization disagreements which occurred in our study tended to be between closely related categories. The most common Pragmatic disagreements were between Labelling and Description (12) and between Response to a Command and Acknowledgment (17). Semantic disagreements were greatest between Volitional

[1]Greenfield and Smith (1976) pages 70-61

object and Locative (5); Volitional object and Locate/Name (5); Locative and Action or State of an Agent (5) and Locate/Name and Locative (5). (There are also several disagreements between Performative and other categories, but the frequency of use of this category may well account for this.) (See Figures One and Two.)

The results of the reliability check suggest that the category set can be safely collapsed for application in the classroom. It is clear that the 29 categories must be modified for practical application. Those categories which are closely related and which had the greatest number of disagreements can be collapsed for use by the teachers. The collapsed categories would then serve as a heuristic to identify communicative intention and content in young deaf children.

Since we have identified the time sequence and order of acquisition (below, Section VII) of linguistic behavior in our study, the categories will enable the teacher to better assess an individual child's development and to suggest appropriate activities to facilitate further development.

On the other hand, the reliability study also suggests that additional research efforts may reasonably use the 29 categories as a reliable means of systematizing the data for study.

D. General Findings

The number of communicative acts per minute increases with age, especially between ages three and four.

1. The amount of videotape time and number of acts per age group is as follows:

2-year-olds	- [illegible] hours, 46 minutes, 34 seconds approx. 444 acts
3-year-olds	- 4 hours, 4 minutes, 30 seconds approx. 540 acts
4-year-olds	- 3 hours, 15 minutes, 31 seconds approx. 481 acts

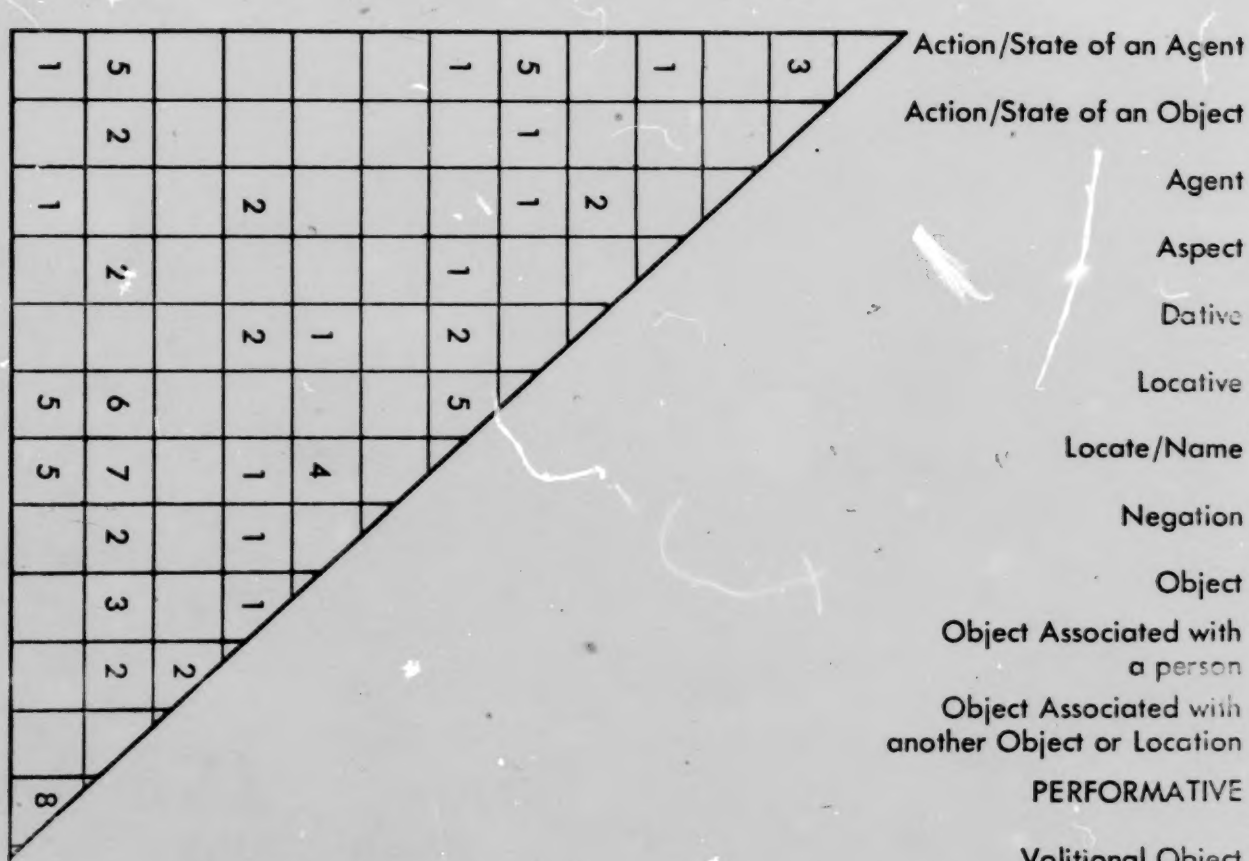
2. The number of acts per minute per age group is as follows:

2-year-olds	- approx. [illegible] acts/minute
3-year-olds	- approx. 2.2 acts/minute
4-year-olds	- approx. 2.5 acts/minute

FIGURE ONE

	Acknowledgment	Command	Demand	Description	Imitation	Labelling	Protesting	Question	Repetition	Ritual	Response to a Command	Response to a Question	Response to a Summons	Request for Confirmation or Acknowledgement	Request for Approval	Summons
Acknowledgment		1	8		2						17			1		
Command			3	9		3	1		1					1		7
Demand				3		6	1		2		2			3		1
Description					2	12	3							1		3
Imitation						1			5		3			2		
Labelling								3			1			2		3
Protesting														2		
Question													1			
Repetition														1		1
Ritual																
Response to a Command																2
Response to a Question																3
Response to a Summons																
Request for Confirmation or Acknowledgement																
Request for Approval																
Summons																

FIGURE TWO


Action/State of an Agent
Action/State of an Object
Agent
Aspect
Dative
Locative
Locate/Name
Negation
Object
Object Associated with a person
Object Associated with another Object or Location
PERFORMATIVE
Volitional Object
3
1
5 1 1
2
1 1
1 2 5
1 2
2 2
1 6 7 2 3 2
5 5 4 1 1 1
2
8

3. Pragmatics
Table B presents the number of pragmatic functions per age group.

4. Semantics

Table C presents the distribution of semantic functions per age group.

5. The total amount of verbal communication has also been broken down by age group. Tables D and E present these figures for two-year-olds; Tables F and G for three-year-olds; and Tables H and I for four-year-olds.

II. Effects of Degree of Hearing Loss and Intervention

1. In this section, we examine briefly all the children with respect to hearing loss, amount of intervention, and communicative development. We will be examining the number of functions expressed non-orally, as in general this yields the highest figure. Table A represented a roster of all the children in the study, and Table J supplements Table A with information about the number of communicative intentions expressed.

(Insert Table J)

2. Findings

Of the two-year-olds, the children with the most severely impaired hearing are those who are nonverbal, as well as those who are expressing fewer semantic and pragmatic functions than the children with less severe losses. Hence, even nonverbal communication appears to be impaired in those children with hearing losses. With one exception, the children who express more functions have had fairly early intervention. For one child in this age group with the greatest communicative capabilities, no prior intervention was reported, but she entered the John Tracy Clinic at a fairly young age (2,0), and is communicating more than one child who entered at a later age (2,9). These two children are matched for aided response but the more communicative child exhibits a more severe unaided loss. Thus, active participation in the Nursery School at John Tracy Clinic may have been a factor influencing this one child's better development.

For three-year-olds, all are verbal, and two have been in the Nursery School since age two. These same two express more semantic functions than the other children who did not have the benefit of the Nursery School before age

TABLE B

TOTAL COMMUNICATIVE INTENTIONS EXPRESSED BY EACH AGE GROUP
(PRAGMATIC CATEGORIES)

	TWO YEARS	THREE YEARS	FOUR (+) YEARS
Acknowledgment	87 (19.6%)	81 (15.0%)	48 (9.9%)
Command	7 (1.6%)	65 (12.0%)	32 (6.7%)
Demand	63 (14.1%)	74 (13.7%)	39 (8.1%)
Description	29 (6.5%)	34 (6.3%)	66 (13.8%)
Imitation	45 (20.3%)	47 (8.7%)	21 (4.4%)
Labelling	72 (6.0%)	33 (6.1%)	54 (11.2%)
Protesting	26 (5.9%)	34 (6.3%)	28 (5.8%)
Question	16 (3.6%)	7 (1.3%)	20 (4.1%)
Repetition	4 (.9%)	5 (.9%)	2 (.4%)
Request for Approval	3 (.7%)	5 (.9%)	10 (2.0%)
Request for Confirmation or Acknowledgment	24 (5.4%)	16 (3.0%)	24 (5.0%)
Response to a Command	25 (5.6%)	56 (10.4%)	35 (7.3%)
Response to a Question	3 (.7%)	3 (.5%)	18 (3.7%)
Response to a Summons	7 (1.6%)	24 (4.4%)	23 (4.7%)
Ritual	16 (3.6%)	14 (2.6%)	14 (2.9%)
Summons	17 (3.9%)	42 (7.8%)	47 (9.8%)
TOTAL ACTS	444	540	481

TABLE C

TOTAL SEMANTIC CATEGORIES CODED BY EACH AGE GROUP

	TWO YEARS	THREE YEARS	FOUR (+) YEARS
Action or State of an Agent	9 (2.0%)	65 (10.7%)	29 (5.5%)
Action or State of an Object	4 (.9%)	6 (1.0%)	3 (.6%)
Agent	3 (.7%)	14 (2.3%)	11 (2.0%)
Aspect	8 (1.8%)	19 (3.1%)	31 (5.9%)
Dative	1 (.2%)	7 (1.1%)	3 (.6%)
Locate/Name	69 (15.4%)	40 (6.6%)	84 (16.0%)
Locative	4 (.9%)	52 (8.5%)	16 (3.0%)
Negation	3 (.7%)	8 (1.3%)	14 (2.7%)
Object	10 (2.2%)	13 (2.1%)	5 (.9%)
Object Associated with an Object or Location	1 (.2%)	1 (.2%)	9 (1.8%)
Object Associated with a Person	1 (.2%)	6 (1.0%)	15 (2.9%)
Performative	329 (73.4%)	324 (53.2%)	275 (52.5%)
Volitional Object	6 (1.3%)	54 (8.9%)	29 (5.5%)
TOTAL ACTS	447	609	524

TABLE D

SEMANTIC ACTS CODED VERBALLY BY TWO-YEAR-OLDS

NUMBER	CATEGORY	% CATEGORY	% VERBAL ACTS
7	Action or State of an Agent	77.8%	11.7%
1	Action or State of an Object	25.0%	1.7%
3	Agent	100.0%	5.0%
5	Aspect	62.5%	8.3%
0	Dative		
30	Locate/Name	43.5%	50.0%
0	Locative		
2	Negation	66.7%	3.3%
5	Object	50.0%	8.3%
0	Object Associated with an Object or Location		
1	Object Associated with a Person	100.0%	1.6%
6	Performative	1.7%	10.0%
0	Volitional Object		
60	TOTAL		

NB: % Category refers to the number of times a given category was encoded verbally when it was expressed; % Verbal Acts refers to the proportion of all verbally encoded acts a given (verbally encoded) category represents.

TABLE E

COMMUNICATIVE INTENTIONS CODED VERBALLY BY TWO-YEAR-OLDS
(Pragmatic Categories)

NUMBER	CATEGORY	% CATEGORY	% VERBAL ACTS
3	Acknowledgment	3.4%	5.4%
2	Command	28.6%	3.7%
1	Demand	1.7%	1.8%
7	Description	24.1%	12.8%
3	Imitation	6.7%	5.4%
27	Labelling	37.5%	49.0%
0	Protesting		
1	Question	6.2%	1.9%
3	Repetition	75.0%	5.4%
0	Request for Approval		
1	Request for Confirmation/Acknowledgment	4.2%	1.8%
0	Response to a Command		
2	Response to a Question	66.7%	3.6%
0	Response to a Summons		
4	Ritual	25.0%	7.3%
1	Summons	5.9%	1.8%
55	TOTAL		

NB: % Category refers to the number of times a given category was encoded verbally when it was expressed; % Verbal Acts refers to the proportion of all verbally encoded acts a given (verbally encoded) category represents.

TABLE F

SEMANTIC ACTS CODED VERBALLY BY THREE-YEAR-OLDS

NUMBER	CATEGORY	% CATEGORY	% VERBAL ACTS
53	Action or State of an Agent	81.5%	26.2%
3	Action or State of an Object	50.0%	1.5%
12	Agent	85.7%	5.9%
17	Aspect	89.4%	8.4%
4	Dative	57.1%	2.0%
22	Locate/Name	55.0%	10.9%
25	Locative	48.0%	12.4%
4	Negation	50.0%	2.0%
8	Object	61.5%	4.0%
1	Object Associated with an Object or Location	100.0%	.5%
2	Object Associated with a Person	33.3%	1.0%
7	Performative	2.2%	3.5%
44	Volitional Object	81.5%	21.8%
202	TOTAL		

NB: % Category refers to the number of times a given category was encoded verbally when it was expressed; % Verbal Acts refers to the proportion of all verbally encoded acts a given (verbally encoded) category represents.

TABLE G

COMMUNICATIVE INTENTIONS CODED VERBALLY BY THREE-YEAR-OLDS

NUMBER	CATEGORY	% CATEGORY	% VERBAL ACTS
6	Acknowledgment	7.4%	4.0%
39	Command	60.0%	26.5%
16	Demand	21.6%	10.9%
10	Description	29.4%	6.8%
2	Imitation	4.2%	1.3%
14	Labelling	42.4%	9.5%
15	Protesting	44.1%	10.2%
1	Question	14.3%	.7%
4	Repetition	80.0%	2.7%
0	Request for Approval		
1	Request for Confirmation or Acknowledgment	6.2%	.7%
3	Response to a Command	5.3%	2.0%
1	Response to a Question	33.3%	.7%
2	Response to a Summons	8.3%	1.4%
4	Ritual	28.6%	2.3%
29	Summons	69.0%	19.7%
147	TOTAL		

NB: % Category refers to the number of times a given category was encoded verbally when it was expressed; % Verbal Acts refers to the proportion of all verbally encoded acts a given (verbally encoded) category represents.

TABLE H

SEMANTIC ACTS CODED VERBALLY BY FOUR-YEAR-OLDS

NUMBER	CATEGORY	% CATEGORY	% VERBAL ACTS
23	Action or State of an Agent	79.3%	14.8%
0	Action or State of an Object		
11	Agent	100.0%	7.0%
20	Aspect	54.4%	12.8%
2	Dative	66.7%	1.2%
30	Locate/Name	35.7%	19.2%
4	Locative	25.0%	2.6%
6	Negation	42.9%	3.8%
3	Object	60.0%	2.0%
5	Object Assoc. with an Object or Location	55.5%	3.2%
4	Object Associated with a Person	26.7%	2.6%
13	Performative	4.7%	8.3%
35	Volitional Object	89.7%	22.4%
156	TOTAL		

NB: % Category refers to the number of times a given category was encoded verbally when it was expressed; % Verbal Acts refers to the proportion of all verbally encoded acts a given (verbally encoded) category represents.

TABLE I

COMMUNICATIVE INTENTIONS CODED VERBALLY BY FOUR-YEAR-OLDS
(Pragmatic Categories)

NUMBER	CATEGORY	% CATEGORY	% VERBAL ACTS
2	Acknowledgment	4.1%	1.7%
9	Command	28.1%	7.7%
10	Demand	25.6%	8.5%
16	Description	24.2%	13.7%
9	Imitation	42.9%	7.7%
16	Labelling	27.8%	13.7%
1	Protesting	3.5%	.8%
7	Question	35.0%	6.0%
2	Repetition	100.0%	1.7%
0	Request for Approval		
1	Request for Confirmation or Acknowledgment	4.2%	.8%
0	Response to a Command		
9	Response to a Question	50.0%	7.7%
0	Response to a Summons		
11	Ritual	78.6%	9.4%
24	Summons	51.0%	20.5%
117	TOTAL		

NB: % Category refers to the number of times a given category was encoded verbally when it was expressed; % Verbal Acts refers to the proportion of all verbally encoded acts a given (verbally encoded) category represents.

TABLE J

CHILD	PRAGMATIC FUNCTIONS EXPRESSED	SEMANTIC FUNCTIONS EXPRESSED
A.B.	14	8
M.H.	12	6
A.H.	15	9
J.H.	10	1
D.M.	8	1
A.Ba.	11	12
D.H.	14	12
A.S.	13	5
J.W.	14	11
A.L.	10	5
L.G.	16	13
N.V.	15	11

three. The child who expresses fewest semantic functions in this age group has the poorest aided response to speech, while the other three children, who are roughly matched for semantic functions expressed, also exhibit aided responses which are similar in degree. Again, given that the two children with roughly similar aided hearing losses who entered Nursery School at age two show somewhat better semantic functional capabilities than the child with a similar loss who was not at the Nursery School as early, the Nursery School appears to have been helpful to communicative development to a certain extent, ceteris paribus.

The same trends appear for four-year-olds. The only child capable of expressing all the possible semantic and pragmatic functions came to the Nursery School at John Tracy Clinic at an early age, and her parents had been in consultation sessions with the Clinic since she was about 5 months old. While she exhibits aided ability which is somewhat lower than the other two four-year-olds, she also appears to have a somewhat higher mental age. The child who is next in order of communicative capabilities has had more intervention than the third child, but also has a somewhat less severe hearing loss (but is also younger). In this case, it is difficult to say whether his better ability in communicating is due to more intervention, or more hearing.

In summary, it appears from our data that the children who enroll early in an active program such as the John Tracy Clinic Nursery School learn to communicate more adequately, given that mental age and level of aided hearing are roughly equivalent,[2] than children who enroll at a later age. This is especially true for the ability to express semantic functions.

III. Findings in Oral Communicative Behavior

This section is based on a subset of the total data which included only the most intelligible and/or unambiguous cases of communicative behavior, and which excluded imitated behavior. For example, if a child had been recorded as saying, "Give me

[2]Unaided loss must be considered to a certain extent as well, though. Two children with aided responses classifiable as B may not be hearing the same. If one has an unaided loss classifiable as "profoundly deaf," and the other an unaided loss of "severely hard-of-hearing," chances are the child with the unaided profound deafness experiences more variables affecting hearing, such as distortion, than the other child. Note, too, that all the children in our study appear to have congenital hearing losses but one, D.H., who lost hearing at nine days of age.

that _____," where the final word (or words) was unintelligible to the coders, this utterance would not be included in the data subset, although the utterance was clearly a demand pragmatically, and the missing word was probably an object. This subset was used primarily as the data base for studies in verbal communication, which included the writing of a Speech Act "grammar." It was felt that it was important not to use data for the grammar which was questionable in any way, as the number of verbal utterances on which the grammar was based was already limited.

1. The Sample

   The first study we undertook examined the extent to which the children in our project were acquiring oral verbal language. We were interested in the degree to which hearing loss as well as age affected oral language development. This was explored along the following parameters: (1) changes in the mean length of utterance (MLU) versus changes in the number of semantic and pragmatic functions expressed; (2) verbal language directed toward a child versus an adult, and language which the child-speaker had initiated or used as a response; and (3) the types of speech act structures children were capable of expressing.

2. The most apparent and predictable observation we can make is that hearing loss retards the development of verbal (oral) communication. Hence we find that the greater the hearing loss, the later language will begin to be acquired. For example, while hearing children are talking before age two, two of the two-year-olds in our study use no verbal communication, and one child just under two (21-22 months) uses no verbal communication. These children are all severely or profoundly deaf. The two children in this age group who are verbal respond to speech at lower (dB) levels when aided. Among the three-year-olds, all have begun to speak, including one child who is profoundly deaf, yet in the four-year-old group, one child does not communicate verbally, and he is profoundly deaf, although his aided response to speech is in the A-B range. The two four-year-olds who use language have losses ranging from moderate to severely deaf in the better ear, with aided responses in the A or B range. We conclude that for our children, verbal language may not begin among the severely or profoundly deaf until at least age three. (See Section VI for individual differences.)

   Some discrepancies will appear between figures in the reliability study and those presented in Sections III, V, and the parts of IV which refer to verbal children. This

is because the study here and in Sections V and parts of IV represent a subset of all communicative behavior: nonfunctional imitated utterances were excluded, as were instances of verbal behavior the content of which was unclear. (See Section I.C.)

3. The results of the first part of the verbal study, MLU as compared with the number of semantic and pragmatic categories expressed, are presented in Table One. MLU has been used as a measure of linguistic development in hearing children in the past (cf. especially Brown 1973), and has been found to give a more accurate assessment of development than measures such as age. However, we have found that it is an inadequate measurement for our subjects. All three age groups exhibit approximately equal mean lengths of utterances, suggesting that their development is similar. This is definitely not the case. One gets the impression in examining the data that, for example, four-year-olds are much more fluent than two-year-olds. MLU does not reveal this, but the impression is supported by the figures for the number of semantic and pragmatic functions expressed. This approach yields a more salient developmental trend because, although a child may use a single word, he or she can use that word in a number of different ways. In other words, the child has become more communicative in that he or she has learned not only more meanings but more functions for which language can be used. That is, as the children expand their understanding of semantic relationships they also learn the ways in which they can intend for them to be taken by the hearer. They exhibit this new learning via extra-linguistic features such as gesture; prosodic features such as stress and intonation; and discourse features such as interacting with the utterance of a previous speaker. (Data on the relationship between degree of hearing loss and MLU versus semantic and pragmatic functions expressed appears in Section VI.)

4. The second part of the verbal study examined initiated versus responsive verbal behavior as directed toward a child or an adult, and we divided this study into three sections: single-word utterances, multi-word utterances, and all utterances. The results are presented in Tables Two, Three, and Four, respectively.

   By comparing the first two tables (Two and Three), we note that three-year-olds tended to use single words to respond

TABLE ONE

VERBAL DATA

Mean Length of Utterance (MLU) versus Number of Semantic and Pragmatic Functions Expressed

AGE:	TWO	THREE	FOUR
MLU*	1.85	1.80	1.85
Semantics	8	13	14
Pragmatics	6	11	10

*MLU is approximate as speech corpus represented less than 100 utterances for each age group.

TABLE TWO

VERBAL DATA

Initiated versus responsive single-word utterances; adult versus child recipient of message

AGE	N	Initiated	A	C	Responsive	A	C
2	6	83%	80%	20%	17%	100%	
3	29	82.75%	50%	45.8%	17.25%	40%	60%
4	27	88.9%	62.5%	37.5%	11.1%	100%	

*Percentage sums may not equal 100 because of behaviors to self.

TABLE THREE

VERBAL DATA

Initiated versus responsive multi-word utterances; child versus adult recipient of message

AGE	N	Initiated	A	C	Responsive	A	C
2	4	75%	100%		25%	100%	
3	41	87.8%	22.2%	77.8%	12.2%	80%	20%
4	28	82.14%	73.9%	26.1%	17.85%	100%	

TABLE FOUR

VERBAL DATA

Combined figures for single- and multi-word utterances, including utterances to self

AGE	N	IA		IC		SELF		I%	RA		RC		R%
		N	%	N	%	N	%		N	%	N	%	
2	10	7	87.5	1	12.5			80	2	100			20
3	70	20	33.3	39	65	1	1.6	85.7	6	60	4	40	14.3
4	55	32	68.1	15	31.9			85.5	8	100			14.54

to children and more than one word to respond to adults. This seems to suggest that they alter their output according to whom they are interacting with. On the other hand, three-year-olds initiate communication with multi-word utterances far more often to children than adults - which is just the opposite of the trends exhibited by the two- and four-year-olds, who tend in general to communicate with adults. The only safe conclusion we can draw is that three-year-olds talk to their peers much more than do the other age groups. All three tables indicate that if there is a type of recipient which children will not respond to, it is a child recipient. Of course, the two- and four-year-olds also do not initiate verbal interaction with one another to a very great extent. Figure Three illustrates these findings graphically.

5.1 There are a number of approaches one can adopt in the writing of grammars for the utterances of children. In the past, the "sentence" has been considered the basic grammatical unit with which to work (where (S(entence) = N(oun) P(hrase) + V(erb) P(hrase)). With this approach, "reduction transformations" have had to be posited to account for the fact that the utterances of children are not usually complete sentences (in the "adult" sense - cf. Bloom, 1970). Prior to such "reduction transformations," and underlying them, too, was the notion that single-word utterances were "holophrases" or holistic sentences, i.e., expressed the idea of an entire sentence, but that the child could not produce adult-type sentences because of physiological constraints, memory limitations, and so on. Bloom (1973), however, attempted to expel these reasons in her chapter "Single-Word Utterances Are Not Sentences." Scollon (1974) presents a number of arguments against considering the "sentence" as the minimal grammatical unit, because one would (if single-word utterances are not sentences) have to consider the onset of language simultaneous with the onset of combinatorial speech or of grammar (i.e., onset of syntax and then sentences). As Scollon points out, this approach does not allow language to begin with single-word utterances, even if these are in vertical constructions.[3]

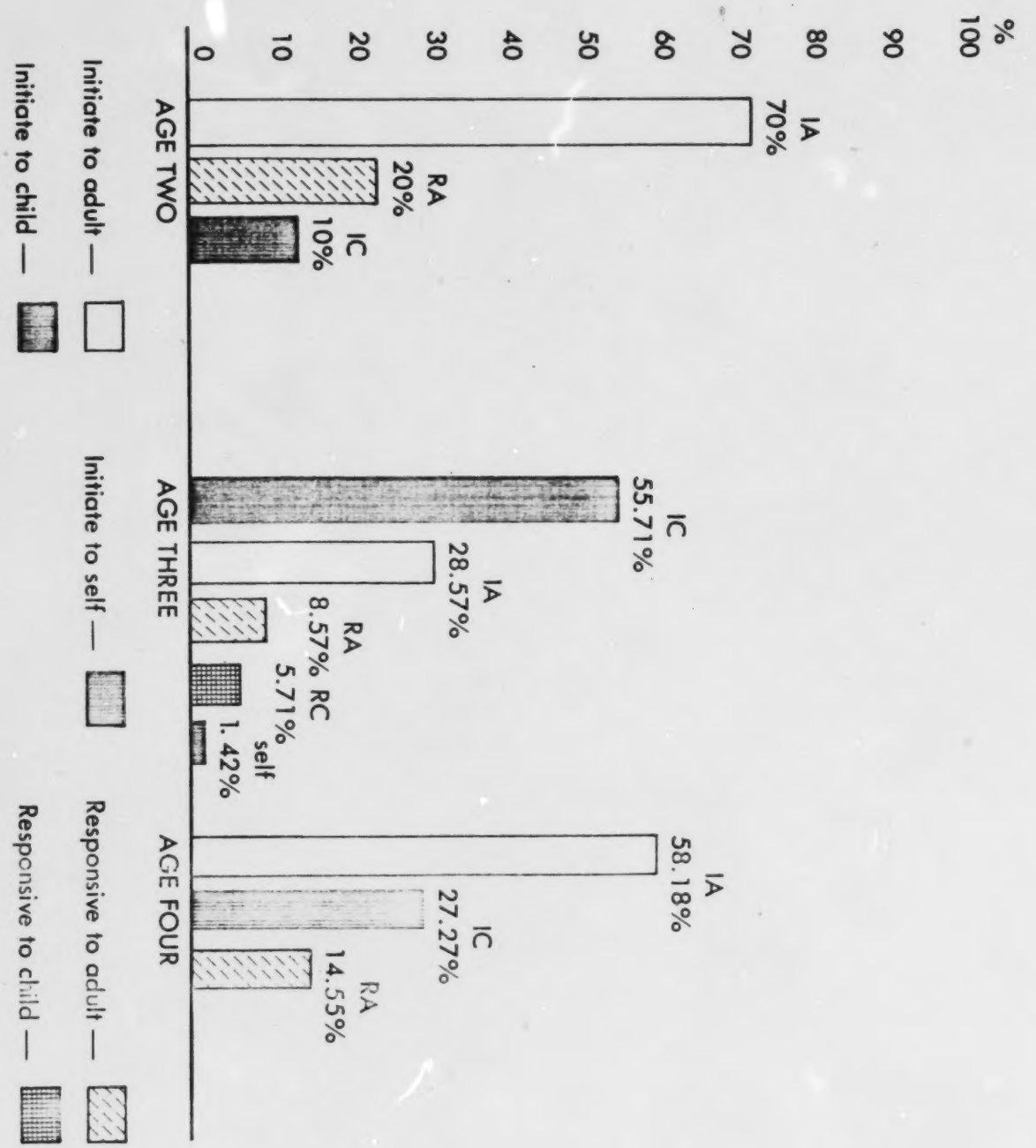
More recently, the speech act has been considered the basic speech unit (cf. Dore, 1973; H. Vetter and R. Howell, 1971). Using such an approach, one sidesteps the entire issue of "sentences" or "syntax."

[3]That is, in a sequence, which may or may not have the utterances of another speaker intervening between each utterance.

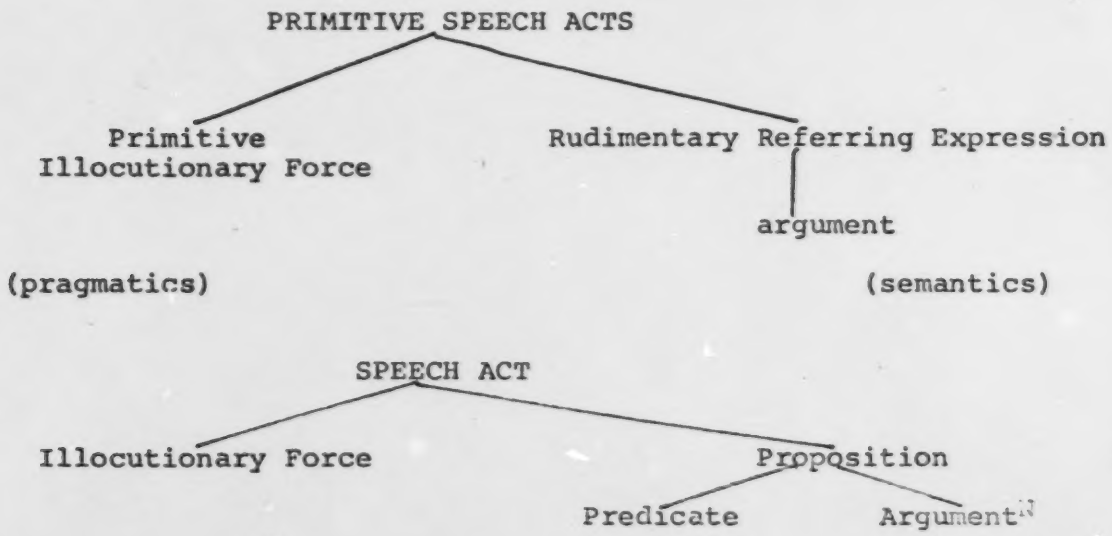
FIGURE THREE

VERBAL DATA

Graphic representation of Table Four: Initiated versus responsive verbal behavior; child versus adult versus self recipient.



In Dore's view, children's earliest utterances (especially one-word utterances) are "primitive speech acts" which consist of an "illocutionary force...and rudimentary referring expression" (i.e., no predicate). These differ from "adult" speech acts in that the latter consist of an illocutionary force and a full (predicate + argument) proposition, e.g.:

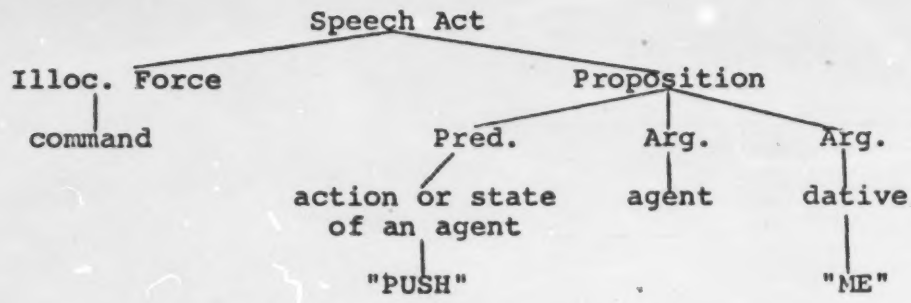


Another way of characterizing the child's (or adult's) language is to utilize a case-grammar approach (Fillmore, 1968; Greenfield & Smith, 1976). This is a semantic model of a less abstract nature than the speech-act model above, which yields information about the acquisition of semantic functions such as "agent," "negation," "dative," and so on. These are the types of functions we have been analyzing in our project. Note that in the speech act formalization, nodes can be added from the ("predicate" and) "argument" nodes and labelled according to the semantic functions. In this way, we can combine the two models. (Furthermore, nodes labelled for specific lexical items can then be appended to those labelled for semantic functions).

Example 5.1.1

From Dore, 1974; Adapted from Searle, 1969

Example from our data:



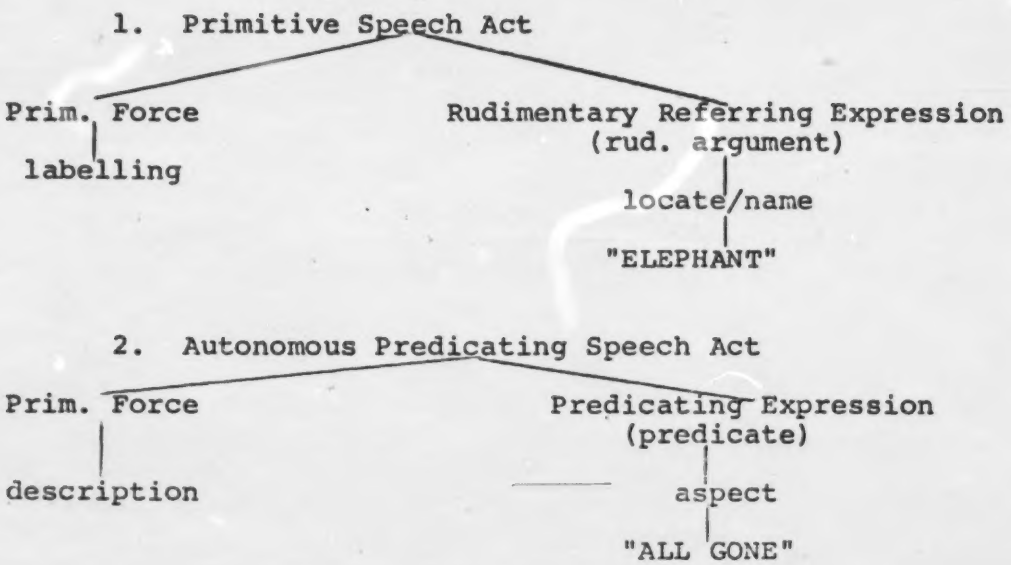
5.2 Not all the children's utterances represented speech act structures such as the one presented above. Some of them, for example, represented Dore's "primitive speech acts," others seemed to be combinations of predicates or arguments.

There are eight logical possibilities for predicate/argument structures, if one takes into account conjoined structures and allows for two possible categories of predicates and arguments. These are: one-predicate structures and more-than-one-predicate structures, and one-argument structures and more-than-one-argument structures. These eight types are illustrated on the following pages. Note that all but one logical type occurs.

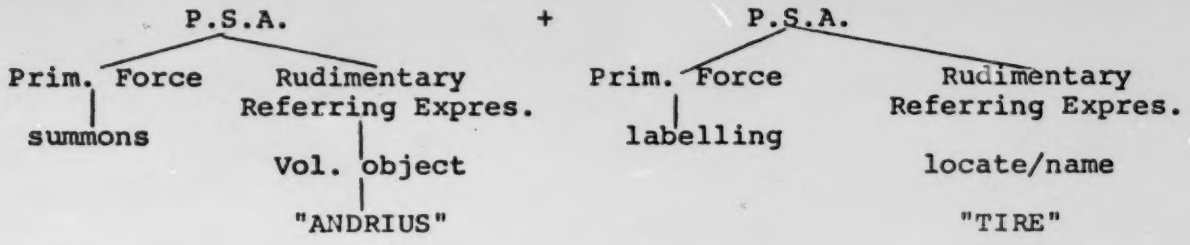
Types 3 and 7 are interesting. These do not develop until age three in our data, and they consist of an attention-getting device (summons) plus some form of speech act. There doesn't seem to be any restriction on the type of semantic function which can be preceded by a summons. Note that these accomplish the task defined by one of the first principles for establishing a topic for conversation: securing the attention of the recipient (cf. Keenan and Schieffelin, 1976).

5.3 On Negation. The development of verbal negation in the form of NO or NOT + UTTERANCE develops at age three in our data. Among the two-year-olds, there is an isolated occurrence of the form "no more, no more;" however, there is no indication that the phrase is analyzed into two morphemes, because while "more" appears once in the two-year-old data, "no" does not appear again at all. "No more" is, furthermore, one of the language formulae actively taught to children at John Tracy Clinic.

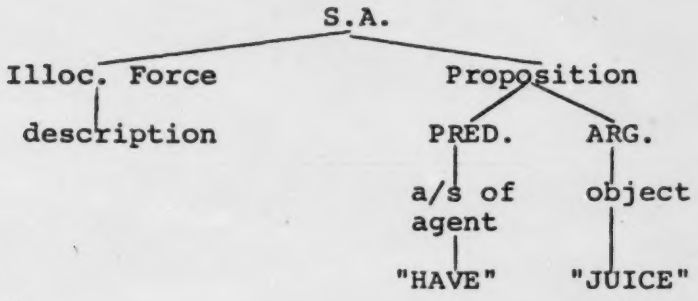
5.2
Logical types



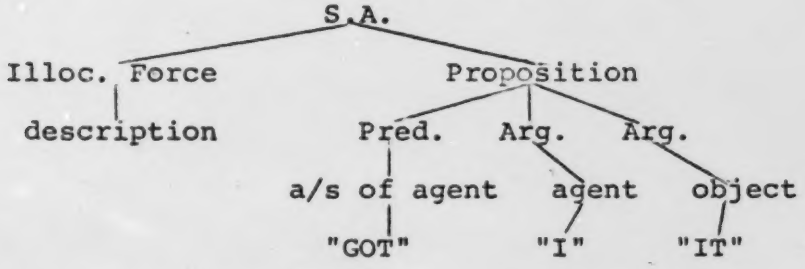
3. Conjoined Primitive Speech Acts (P.S.A.)



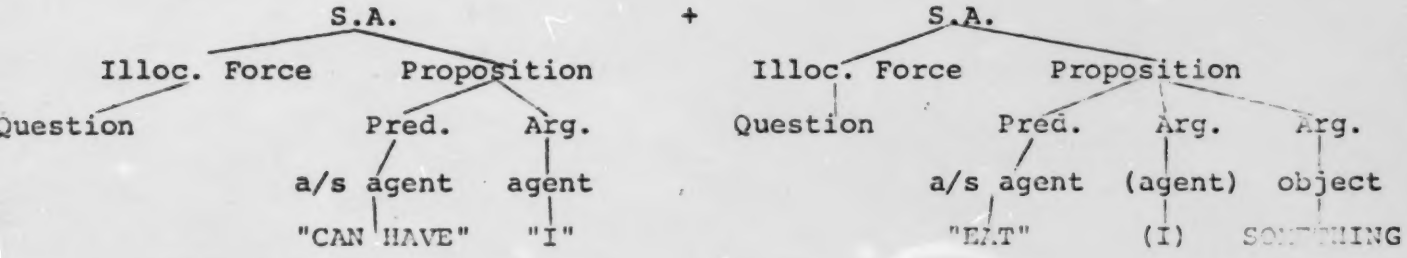
4. "Intransitive" Speech Act (i.e., one argument)



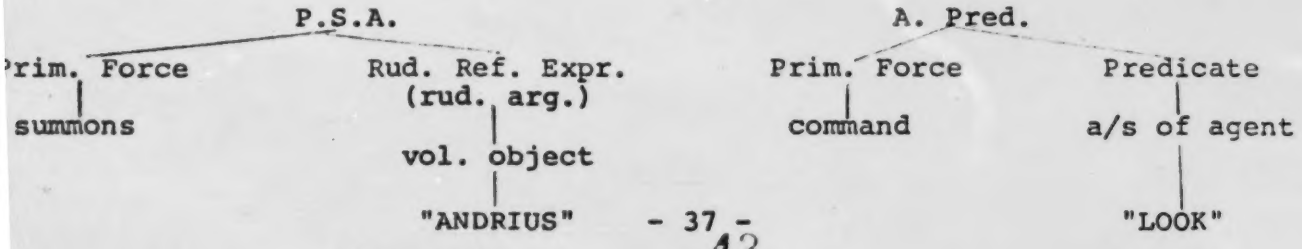
5. "Transitive" Speech Act (i.e., more than one argument)



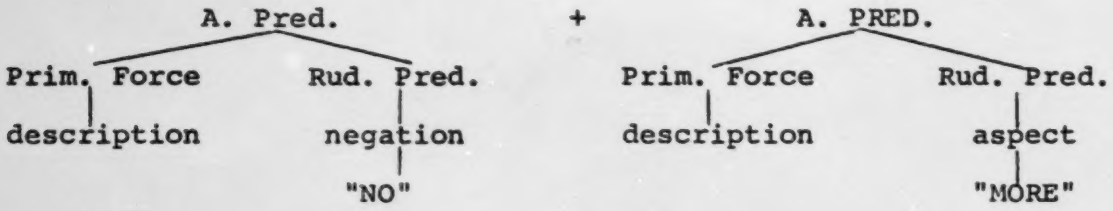
6. Conjoined Speech Acts (trans. or intrans.) (age four)



7. Conjoined P.S.A. and autonomous predicate



8. Conjoined Autonomous Predicates. (No occurrences, unless we analyze negation itself as a form of predication. There is, however, no particular evidence for considering negation a separate, i.e., analyzed, morpheme at the stage where this datum appeared (age two).



IV. Findings in Nonverbal Communicative Behavior

1. Studies of nonverbal communication were undertaken along the same lines as those of verbal communication, with the exception of the writing of a "grammar" for nonverbal utterances. This is because the models proposed for speech-act and case grammars were not proposed to handle nonverbal data, and also because most of the nonverbal behaviors were nonlinguistic and thus should not be characterized in a "grammar," which is essentially a conventionalized rule system for language.

   Table Five presents the results of calculations for the number of semantic and pragmatic functions expressed nonverbally for each age group. (For correlations with hearing loss, see Section VI.) While semantic functions exceeded pragmatic functions in the verbal data, the opposite is the case for the nonverbal data. We attribute this to two causes. First, communicative intentions (our pragmatic functions) develop long before semantic distinctions, and far prior to acquisition of words.[4] Secondly, semantics is really a matter of language, but the nonverbal communication the children use is not language in any strict sense: it does not tend to be rule-governed, nor does it tend to be conventional in the sense that adult language is (with some exceptions, of course). It is also considerably more vague, perhaps since the children have no model for semantics of a gesture language because they are in an oral program. They <u>do</u> have input for semantics of verbal language.

   A second important observation is that the number of pragmatic functions expressed nonverbally is equivalent for all age groups. This is the illustration of the point made in the preceding paragraph: communicative intentions seem to develop well in advance of semantic distinctions and the acquisition of words. There is little reason to believe that they don't develop well before age two, as they do in hearing children.

2. Table Six illustrates the percentage of initiated versus responsive nonverbal communication directed toward a child or adult recipient. Aside from the observation that nonverbal behavior is far more common than verbal

[4] cf. Bates, Camaioni and Volterra, 1975

TABLE FIVE

NONVERBAL DATA

Number of pragmatic and semantic functions expressed in nonverbal behavior*

AGE:	TWO	THREE	FOUR
Semantics	5	12	12
Pragmatics	15	15	14**

*Although the table represents nonverbal behavior, the figures are just those nonverbal behaviors produced by the children who are oral.

**The missing function is repetition, but this seems to be an artifact. We would expect four-year-olds to be capable of repeating their own nonverbal behavior.

TABLE SIX

NONVERBAL DATA

Initiated versus responsive nonverbal behavior; child, adult or self recipient

AGE	N	IA		IC		SELF		I%	RA		RC		R%
		N	%	N	%	N	%		N	%	N	%	
2	304	158	51.9	18	5.92	6	1.97	59.86	106	34.86	16	5.26	40.14
3	289	58	20.06	59	20.42	6	2.08	42.56	122	42.21	44	15.22	57.44
4	342	93	27.19	117	34.21	2	.58	61.99	82	23.98	48	14.04	38.01

behavior is the more striking observation that children are much more responsive with nonverbal communication; that is, they use nonverbal communication to respond more than they use verbal communication to respond, while verbal behavior tended to be initiated. Also, the three-year-olds again stand out as exhibiting somewhat different trends, with the greatest amount of behavior to self,[5] and less initiated behavior than the other groups (or alternatively, more responsive behavior). Hence, the three-year-olds tend to initiate communication verbally but respond to it nonverbally more so than the other groups.

We also see in the nonverbal communication a steady rise (with age) in communication to children. This is what one might expect for communicative behavior in general, and thus it appears that the children in the study are progressing with respect to nonverbal communication more like we would expect hearing children to progress.

Figure Four more graphically represents these findings (especially the blackened bar).

3. Communicative behavior of the nonverbal children

(1) Up until now, we have been primarily discussing the children in our study who have demonstrated some ability in oral language. There are, however, those children who do not yet exhibit such ability. As mentioned below (Section VII.2), there are children who, semantically, express exclusively performatives, and the non-oral children express fewer pragmatic functions than do the oral children, in general (considering the nonverbally expressed pragmatic functions of the oral children). Table Seven presents the nonverbal children and the number and type of semantic and pragmatic functions they are able to express via their non-oral communication.

(2) PRAGMATICS

All the children who are non-oral lack the pragmatic function repetition: they are capable of imitating the actions of others, but do not repeat their own communicative actions. This may be due to the fact

[5]Note that this was also true for verbal communication, but more so for nonverbal.

FIGURE FOUR

NON VERBAL DATA

Graphic representation of Table Six: Initiated versus responsive non-verbal behavior; child versus adult versus self recipient

TABLE SEVEN

CHILD	AGE	HEARING LOSS	#PRAG. FUNCTIONS EXPRESSED (of 16 possible)	#SEMANTIC FUNCTIONS EXPRESSED (of 13 possible)
D.M.	2,0-2,6		8 - Uses: demand question response to a command imitation summons protesting request for confirmation or acknowledgement acknowledgement	Uses only performatives
J.H.	2,0-2,1		10 - Uses: demand question labelling response to a summons response to a command imitation protesting request for approval request for confirmation or acknowledgement acknowledgement	Uses only performatives
M.H.	1,9-1,10		12 - Uses: Demand command labelling response to a question response to a summons response to a command imitation summons description protesting request for confirmation or acknowledgement acknowledgement	6 - Uses: performative locate/name vol. object a/s agent dative locative
A.L.	4,11-5,0		10 - Uses: demand command question labelling response to a summons response to a command imitation summons protesting ritual	5 - Uses only performative locate/name a/s agent a/s object locative

that these children, all being severely or profoundly deaf, may see others communicate, but cannot see themselves and, of course, cannot hear themselves.

All but one child lacks the function description, presumably a more sophisticated pragmatic function than labelling, although the child who does express non-oral descriptions is the youngest of the non-oral children. She is roughly equivalent in cognitive development to the other children, relative to age.[6] However, she has had some previous intervention prior to attending Summer School at John Tracy Clinic, and so received intervention earlier than any of the other children in our study (dating from August 1975, when she was 11 months old).

Three out of four of the non-oral children produced no responses to questions, but as mentioned below (Section VII.4 (7)), this is probably due to the fact that questions were rarely directed toward these youngsters; three out of four also did not produce requests for approval, a function which was expressed increasingly with age, though the child who did produce this function was not the oldest of the non-oral group. Also, three out of the four non-oral children produced no ritual functions, and this may be a reflection of less social integration, as ritual behaviors (e.g. "hi," "bye," "thank you") are frequently used in situations involving some form of social transaction.

The other functions which the non-oral children do not express are probably the result of idiosyncracy and not related to degree of hearing loss.

(3) Semantics

All children, oral or non-oral, express the unanalyzed, action-accompanying function performative. Of those children who are non-oral who have progressed beyond

[6] All children but one, D.M., score average or somewhat above average for chronological age on measures such as Leiter International Performance Scale, Vineland Social Maturity Scale, selected sub-parts of the Bayley Scales, nonverbal sections of the Stanford-Binet Intelligence Test, and the Smith Nonverbal Performance Scales, and so on. D.M. tests somewhat below normal on various subtests, ranging from 9 to 24 months when tested at age 18 months.

this point, it is easier to describe what they do not express than what they do express. These children do not express:

1) agent
2) aspect
3) object
4) negation
5) object associated with another object or location (OAWOOL)
6) person associated with an object or location (PAWOOL)

Thus, their development is not consonant with what Greenfield and Smith report, i.e. that agent and object are acquired prior to action or state of an agent and action or state of an object, respectively. Both non-oral children who are beyond the performative stage express action or state of an agent, but not agent. One of the children uses action or state of an object, though neither of the two use object.

Certain aspects of negation, especially rejection and nonexistence, appear relatively early in the Greenfield and Smith data (at about 18 months); use of "no" to refer to desire for a forbidden object appears with volition, after performatives in order of acquisition. This is not the case for our data, however: even these two children who are beyond performatives do not express negation of any sort. To do so it would be necessary that they display a head shake.

While aspect, object associated with another object or location, and person associated with another object or location do not yet appear, and are also late to appear in the Greenfield and Smith study, we have the same result with respect to locative that appeared for the oral children, namely, an early appearance. We suggest that this is because young hearing impaired children pay special attention to visuospatial arrangements, probably in compensation for an impaired auditory ability.

(4) Initiated and Responsive Behavior

For the non-oral children, there is an extremely clear pattern for initiated and responsive communicative behaviors. A sharp division occurs between the children

who are two-and-a-half, and others, and the child who is 4,11 to 5 years of age. In every case, for the two-year-old group, communication to adults far exceeds communication to children, and for two of three cases responsive behavior is not significantly less than initiated behavior. For the four to five-year-old, however, communication to children exceeds communication to adults, especially for initiated behavior; and initiated behavior exceeds significantly responsive behavior. Hopefully, this is a reflection of the increase in social integration which would be expected to occur by the time a child is five-years-old (see Table Eight).

V. Combined Verbal and Nonverbal Behavior

1. Of all the children in the study, those who use both word and gesture in combination to communicate do so some 10% of the time.[7] Two-year-olds use combinations 6.25% of the time, three-year-olds 11.93% of the time, and four-year-olds 10.32% of the time. (Once again the three-year-olds stand out.) These results are illustrated in Table Nine.

2. Communication which combines word and gesture is perhaps the most efficient type, particularly for children who have not fully acquired the conventions of using only verbal or nonverbal communication. There were at least four kinds of word and gesture combinations used by the children in our study, described as follows:

Type A: Word and gesture are used to express the same communicative function.

e.g. "Andrus says 'no' and shakes his head."

"David points to a tire and says 'tire'."

Type B: Word and gesture are used to express communicative functions which are different or only obliquely related.

e.g. "Albert says 'bye' and extends his hand."

"David says "Nathaniel, come here' and waves a shovel."

[7]That is, communication combining word and gesture represents an average of 10% of all communication, verbal and nonverbal

TABLE EIGHT

CHILD	AGE	INITIATED			RESPONSIVE		
		Adult	Child	Total	Adult	Child	Total
D.M.	2,0-1	14 (40%)	5 (14.28%)	54.28%	12 (34.28%)	4 (11.42%)	45.71%
J.H.	2,0-1	34 (49.2%)	4 (5.8%)	55.07%	31 (44.93%)	0	44.93%
M.H.	1,9-1,11	38 (56.72%)	8 (11.94%)	68.65%	18 (26.865)	3 (4.48%)	31.34%
A.L.	4,11-5,0	2 (6.45%)	17 (54.84%)	61.29%	5 (16.13%	7 (22.58%)	38.71%

TABLE NINE

COMBINED VERBAL/GESTURAL COMMUNICATIVE BEHAVIORS

AGE TWO				AGE THREE					AGE FOUR			
Child 1	Child 2	Total	%	Child 1	Child 2	Child 3	Total	%	Child 1	Child 2	Total	%
4	6	10	6.25	2	21	16	39	11.93	22	17	39	10.32
TOTAL BEHAVIORS:		160*		TOTAL BEHAVIORS:			327		TOTAL BEHAVIORS:		378	

*Total behaviors do not equal the sum of those in Tables Four and Six because Table Six includes nonverbal children; Tables Four and Nine cannot.

Type C: Word explicates or supplements gesture or vice versa; a gesture may expand a pronoun.

e.g. "Alyssa holds up a cookie and says 'I got it'."

"David says 'leave it' and pushes Nathaniel's hand away."

Type D: Gesture supplies a semantic feature missing from a verbal utterance by pointing to or tapping or otherwise indicating non-vaguely the agent, object, dative, and so on.

e.g. "Andrus says 'have juice' and indicates other children with his hand."

"Leslie points to another child's paper and says 'not purple'."

Table Ten displays the frequencies of these types. Note that Type B, the most unclear, does not occur at all at age four, suggesting that children have by then learned to be less egocentric about using gestures which appear unrelated to accompanying words. On the other hand, there is a rise in the use of Type C, the type adults tend to use, and both Types A and C remain the most frequent.

VI. Individual Differences

The above discussions centered upon differences in communicative behavior for age groups (i.e., two, three, and four-year-olds). However, it is frequently the case, particularly in a subject pool as small as ours, that one or two children behave in a vastly different manner from the others, thus "skewing" the data to a certain extent, and making the generalizations somewhat less valid. The purpose of this section is to shed light on the individual differences between children in our study, and to present findings which are revealed by studies of individuals. Please refer to Table Eleven.

1. Individual two-year-olds

Although AB, a two-year-old, has a larger MLU than many others, the number of semantic and pragmatic functions he is able to express is smaller than for the other verbal

TABLE TEN

TYPES OF WORD + GESTURE COMMUNICATIVE BEHAVIORS

AGE	TYPE A		TYPE B		TYPE C		TYPE D		(unclear cases)	
	N	%	N	%	N	%	N	%	N	%
2	3	30	1	10	3	30	2	20	1	10
3	14	35.89	6	15.38	16	41.02	3	7.69	0	0
4	11	28.94	0	0	18	47.36	9	23.68	0	0

TYPE A: Word and gesture are used to express same communicative function.

TYPE B: Word and gesture are used to express communicative functions which are different or only obliquely related.

TYPE C: Word explicates or supplements gesture, or vice versa. Gesture may expand pronoun.

TYPE D: Gesture supplies a semantic feature missing from the verbal utterance, by means of pointing to or tapping the agent, object, dative. Gestures not included here holding or reaching for an object, looking at it, and other vague cases. (These would be included in Type C.)

TABLE ELEVEN

INDIVIDUAL DATA

Individual differences in MLU/No. functions expressed/Degree hearing loss

	CHILD	DEGREEofHEARING LOSS (Unaided)	AGE	MLU	Vsem**	NVsem	Vprag	NVprag
1.	AB	Hard-of-Hearing (HOH)	2,9-10	2.0	5	3	3	13
2.	AH	Severely hard-of-hearing to severely deaf	2,0-5	1.71	6	5	4	13
3.	AS	Profoundly deaf	3,2-3	1.16	5	5	4	12
4.	ABa	Mild-to-moderate-RE Profoundly deaf-LE	3,0-6	1.77	10	12	9	10
5.	DH	Severely deaf-RE Profoundly deaf-LE	3,0-6+	2.6	12	8	8	13
6.	JW	Severely HOH-Severely deaf	3,4-5	1.66	5	6	3	15
7.	LG	Profoundly deaf-RE Severely to profoundly deaf-LE	4,0-6	2.42	14	10	10	14
8.	NV	Sharply sloping Moderate-to-severe	4,2-3	1.27	6	12	6	13

**Vsem, NVsem mean "verbal semantic functions" and "nonverbal semantic functions," respectively. Vprag, NVprag mean "verbal pragmatic functions" and "nonverbal pragmatic functions," respectively.

children.[8] He has a greater hearing loss than the other verbal two-year-old, AH, and the fact that he has produced fewer functions confirms our prediction that degree of hearing loss as well as age affects acquisition of communicative functions. Three of the semantic functions AB produced verbally, furthermore, occurred in the same utterance, an utterance with an adult model immediately prior. Note that AH, with a smaller MLU, produces the same number of nonverbal pragmatic functions as AB, but more verbal pragmatic functions and more verbal and nonverbal semantic functions.

2. Three-year-old individuals

Again according to our predictions, the child in the verbal three-year-old group with the greatest hearing loss (profound deafness) also produces fewer functions than the three-year-olds with less severe losses (except for nonverbal pragmatic functions, which exceed one child, but this will be explicated below; and verbal semantic functions, which match one child). In this case, AS's MLU is also lower than that of the other children. JW, who is severely deaf, produces the second-to-least number of communicative functions for this age group. Note that he seems to rely upon the nonverbal expression of pragmatic functions. ABa and DH, who are matched with respect to number of communicative functions expressed as well as age, can now be differentiated by MLU. Verbal semantics expressed is an important measure as well, because it represents the most adult-like conventional form of communication. Note that in every age group the child with the smallest degree of hearing loss produces the greatest number of verbal semantic functions.

3. Individual four-year-olds

Although the two verbal four-year-olds seem more or less alike in degree of hearing loss, LG clearly shows better communicative development in terms of MLU and all functions expressed except nonverbal semantics. This is because she chooses to encode half of her communication verbally, and semantic functions can be better expressed linguistically. Similarly, pragmatics is easier to express nonverbally; that is, the clues as to what type of communicative function

[8]His MLU is high perhaps because one four-morpheme utterance in our sample came immediately following an adult model, though normally AB would not produce an utterance of four morphemes.

an utterance is expressing tend to be extra-linguistic and nonverbal, e.g. prosodic, gestural, and so on. This explains why the profoundly deaf child in the three-year-old group produces more nonverbal pragmatic functions than one three-year-old with a milder hearing loss: she may be, because of her deafness, relying more on nonverbal communication, while the child with a milder loss is able to rely more on verbal means.

4. Other individual studies

A. We also examined initiated versus responsive verbal behavior in individuals, and the results appear in Table Twelve (compare with Table Four, where averages for age groups are given). The two-year-old who is responsible for 12.5% verbal behavior initiated to a child in Table Four[9] is AB, who initiates communication mostly to children. Both two-year-olds respond only to adults.

In the three-year-group, the two children who initiate entirely to adults are offset by the one who tends to initiate to children (DH). This is because this particular child produced more verbal acts than the other three combined, and over 90% of those acts are initiated to children. Hence, the conclusion that three-year-olds tend to initiate verbal behavior more to children than adults is inaccurate; rather, one three-year-old exhibits this tendency. When DH is excluded from analysis, the trend is as follows:

N	Initiated	A	C	Responses	A	C
53	38 (71.7%)	28 (73.7%)	10 (26.3%)	12 (22.6%)	9 (75%)	3 (25%)[10]

Thus three-year olds tend to communicate to adults in general, initiating or responding to them about three-fourths of the time.

[9]Note the discrepancies between Tables Four and Twelve for figures for number of communicative acts. This is because Table Four represents the subset described in Section I.C. (Communicative Acts in this section, however, are totals, including imitations and certain unclear utterances.

[10]Sums of percentages may not equal 100 due to behaviors to self, which are not included.

TABLE TWELVE

INDIVIDUAL DATA

Individual differences in initiated vs. responsive verbal behavior; child or adult recipient of message

CHILD	AGE	N	Initiated	A	C	Responsive	A	C
AB	2, 9-10	4	75%	33.3%	66.6%	25%	100%	--
AH	2, 0-5	13	92.3%	100%	--	7.7%	100%	--
AS	3, 2-3	10	80%	100%	--	10%**	100%	--
ABa	3, 0-6	35	82.85%	65.5%	34.5%	11.4%	25%	75%
DH	3, 0-6	62	93.54%	6.89%	93.11%	6.46%	75%	25%
JW	3, 4-5	8	12.5%	100%	--	87.5%	100%	--
LG	4, 0-6	80	86.25%	37.7%	62.3%	12.75%	100%	--
NV	4, 2-3	22	90.1%	85%	15%	9.9%	100%	--

**Sums of percentages for communication to child versus adult may not equal 100 due to communication to self.

For four-year-olds, the differences between the two subjects are like those of the two-year-olds. While initiated communication remains greater than responsive (all of which is directed toward an adult), the children differ with respect to their initiated communication to adults. LG, who is the most verbal of the four-year-olds, directs roughly two-thirds of her initiated communication to children, while the less verbal child (NV) directs only 15% of similar communication to children. Thus, one measure, interestingly enough, which does correlate with MLU is the amount of verbal communication initiated for a child recipient. Thus, the three children with the highest MLUs for each age group are the same three who initiate most of their communication to children. Why this should be the case is unclear.

B. A particularly intriguing result arose in response to the following questions: Does verbal linguistic ability have its basis in gesture and other nonverbal (motor) abilities, as, for example, Doreen Kimura[11] and others have argued? Does the ability, in deaf children, to communicate via gesture precede and lay the foundations for verbal linguistic ability? We might begin to test this last hypothesis, upon turning the question into an hypothesis, by checking to see whether (1) the number of semantic and pragmatic functions expressed nonverbally exceeds the number expressed verbally; and (2) the types of functions verbally expressed are a proper subset of those expressed nonverbally. For such questions to be answered, it is necessary to take each child individually, so not to obscure any exceptions which may arise.

With respect to semantic functions, for four children (aged two, two, three, and four) gestural expression of semantics is less broad than verbal expression, which might be expected given that semantics is linguistically defined, and nonlinguistic manual communication is probably not conducive to expression of semantic functions. However, for one child (age three), the number of semantic functions expressed verbally and nonverbally is identical, and for three children (ages three, three, and four), the number of semantic

[11]In "The Neural Basis of Language qua Gesture" (1976)

functions expressed gesturally exceeds those expressed verbally - an unexpected finding. Furthermore, there is no subset relation between verbal and nonverbal semantic functions, with the exception of one four-year-old for whom verbal semantic functions are a subset of nonverbal, the unexpected case. Therefore, an hypothesis is not supported by findings for semantic functions.

For pragmatic functions, on the other hand, with the exception of one child, the functions expressed verbally are (1) a proper subset of those expressed nonverbally, and (2) fewer than those expressed nonverbally. The one exception (ABa, age three) produces nine pragmatic functions verbally and ten nonverbally, but the intersection of the two sets is eight.[12] The exception is that ABa expressed verbally a ritualized form, but is not recorded as expressing a ritual form nonverbally. This seems intuitively to be merely an accident of the data sample, though, as we would expect ABa, who is generally quite communicative, to, e.g., wave goodbye, or perform some other social routine.

These findings are both expected and somewhat suggestive. It looks as if, for deaf and hard of hearing youngsters, communicative intentions (pragmatic functions) are acquired and expressed nonverbally prior to their being expressed verbally. It is not known what is the case for hearing children, although it would not be surprising to see a similar relationship. We have by no means concluded, however, that nonverbal communicative intentions somehow lay the foundations for verbally-expressed communicative intentions. In fact, we probably do not know what the crucial questions are which must be answered in order to suggest that one is the basis for the other.

VII. Comparisons with Hearing Children

1. We will now examine the kinds of trends found in our study as compared to trends uncovered in other studies, especially the studies of Greenfield and Smith (1976).

[12]NB: the intersection of the set of verbal functions and the set of nonverbal functions should always equal the members of the set of verbal functions for our hypothesis to gain support.

2. The first notable trend occurs with respect to performatives, the first type of semantic function to develop. In the words of Greenfield and Smith:

> "Both children began speaking by using non-standard sounds to accompany their actions. Later, they used easily recognizable words in similar ways. Some words are first used in a performative sense and are later transferred to factual statements...The connection with action is less strong in later usage, but performatives retain the characteristic of constituting an act." (Page 81)

Our subjects follow the rule of acquisition of performatives first as well. Among those children who are nonverbal, for instance, are those who produce almost exclusively performatives. Performatives also form the largest category for all age groups when verbal and nonverbal data are combined (cf. Table Thirteen).

3. Table Thirteen represents the order of acquisition of only those semantic categories which coincide with Greenfield and Smith's. Certain of their categories and ours have been excluded merely because they were not comparable. For a discussion of the order of acquisition for our pragmatic functions (without comparisons to Greenfield and Smith, who offer no pragmatics data), see below, Section VII.4.

The primary difference between Greenfield and Smith study and ours is that the former is a longitudinal account of acquisition while ours is a cross-sectional study. Thus, we can only glean acquisition order by looking at the number of times a given function was encoded, and assume that those functions which were encoded most frequently were acquired earlier than those encoded least, and vice versa. One problem with this approach is that artifacts of the data may appear which significantly alter the acquisition order. For example, we have no occurrences of action or state of an object in the verbal data for four-year-olds, but for two-year-olds, it is ranked (albeit last). We assume, however, that if two-year-olds express this semantic function, four-year-olds are able to. Also, certain functions drop in rank for each successive age group as new ones are acquired and replace the

TABLE THIRTEEN

Acquisition order correlations between Greenfield and Smith and John Tracy Clinic Project

Verbal Data Only

G & S* AGE:	TWO	THREE	FOUR	COMBINED
performative	performative	a/s agent	vol. obj.	a/s agent
vol. obj.	a/s agent	vol. obj.	a/s agent	vol. obj.
agent	object	location	aspect	aspect
a/s agent	aspect	aspect	performative	performative
object	agent	agent	agent	location
a/s object	a/s object	object	location	agent
dative	obj. assoc w obj. or loc.	performative	obj. assoc w obj. or loc.	object
obj. assoc with obj. or loc.	(location)**	dative	object	obj. assoc w obj. or loc.
location	(vol. obj.)	a/s object	dative	dative
aspect	(dative)	obj. assoc. w obj. or loc.	(a/s object)	a/s object

*G & S order represents actual observations of time of acquisition, whereas our orders represent frequencies of occurence per age group (i.e., cross-sectional data).

**Items in parentheses are those for which there is no recorded occurrence.

Nonverbal Data Only

G & S AGE	TWO	THREE	FOUR	COMBINED
perf.	perf.	perf.	perf.	perf.
vol. obj.	vol. obj.	location	a/s agent	location
agent	object	vol. obj.	location	a/s agent
a/s agent	location	a/s agent	aspect	vol. obj.
object	aspect	object	vol. obj.	aspect
a/s object	a/s object	a/s object	OAWOOL	object
dative	a/s agent	dative	a/s object	a/s object
obj. assoc w obj. or loc.*	dative	agent	object	dative
location	(agent)	aspect	dative	OAWOOL
aspect	(OAWOOL)	(OAWOOL)	(agent)	agent

*Herafter OAWOOL

Verbal and Nonverbal Data Combined

G & S AGE:	TWO	THREE	FOUR	COMBINED
perf.	perf.	perf.	perf.	perf.
vol. obj.	object	a/s agent	aspect	a/s agent
agent	aspect	vol. obj.	vol. obj.	vol. obj.
a/s agent	a/s agent	location	a/s agent	location
object	vol. obj.	aspect	location	aspect
a/s object	a/s object	agent	agent	agent
dative	location	object	OAWOOL	object
OAWOOL	agent	dative	object	a/s object
location	dative	a/s object	a/s object	dative
aspect	OAWOOL	OAWOOL	dative	OAWOOL

former function in terms of frequency. While object is ranked second for two-year-olds in the combined verbal/ nonverbal data, by age four it drops to eighth place, and is surpassed by "object associated with another object or location" (OAWOOL), a function which is ranked tenth in the two- and three-year-old group.

Note that there is less correlation between Greenfield and Smith's order (which is verbal) and our verbal order than, e.g. with our combined order. While performatives come earliest for Greenfield and Smith, they do not for three- and four-year-olds in our verbal only order. This is perhaps because we are studying children whose tendency is to rely less on verbal communication, and so the stages which hearing children pass through in learning to speak are passed through by our children in using gesture and combined word and gesture, and need not be passed through again once verbal language takes over.

Another great difference between our order and that of Greenfield and Smith is the high rank of location in our study. This corresponds to our function, locative, which is perhaps broader and thus includes more than the Greenfield and Smith category location.

Aspect actually corresponds to Greenfield and Smith's modification, but includes adverbial-modification such as "all gone," and although there did not appear to be significant differences between the two, our aspect always appears in advance of theirs (except for the nonverbal, three-year-old column). One possible explanation for this is that our children are all older (two and over), while Greenfield and Smith note the occurrence of modification of an event at eighteen to nineteen months (1976, pp. 154-155). Our children may thus have already acquired the function aspect before the study began. The problem with this kind of explanation, though, is that it should hold for all functions; that is, Greenfield and Smith note the acquisition of all-smantic functions prior to twenty months, while those of our children who are verbal are all over twenty-four months. Perhaps there is something special about aspect which allows hearing impaired children to acquire it early (it may refer to color or size, for example).

A possible alternative explanation is that, since 'no more' (negated aspect) is one of the language formulae actively

taught the children here at John Tracy Clinic, it is used more frequently during classroom activities. For example, 'more' and 'no more' occur many times during snacktime. If this explanation is the correct one, it would represent the only case of a language formula which is actively taught so greatly affecting acquisition order.

Another difference appears in the order of acquisition between agent and action or state of an agent, and object and action or state of an object. We have one example of action or state of an object preceding the acquisition of object (nonverbal, age four). This is contrary to what happens in the Greenfield and Smith study where both subjects developed "the ability to express the action or state of an object after they have expressed the object of an action" (p. 138). In all our data, secondly, agent follows expression of action or state of an agent, also in opposition to Greenfield and Smith's subjects. This may be because the children in our study were in an environment the participants of which were fairly stable and predictable while for Greenfield and Smith, "especially at the early stages, it [i.e., expression of agent] mainly seems limited to situations where the agent cannot be taken for granted by the children. This state of affairs excludes the encoding of self as agent" (p. 111). Where agents can be taken for granted, then, one would expect them to be encoded less.

It is clear from the discussion above that there is a varied relationship between the longitudinal data set presented by Greenfield and Smith and the cross-sectional data in our study. However, we have calculated the coefficient of correlation using the Spearman rho formula. Values range from zero to one (0.0 to 1.0) where zero or low values indicate there is little or no relationship between the variables while high values suggest that there is likely to be a marked relationship between them. As Table Fourteen illustrates, correlation is fairly low with the closest relationships occurring between our combined verbal and nonverbal scores and the Greenfield and Smith data. Four-year-olds show the lowest correlation, again suggesting that the four-year-olds, using more sophisticated communicative encodings, have already acquired many of these functions and are now using them less frequently.

4. Other Trends

(1) Greenfield and Smith note a tendency for the indicative use of a function or precede its volitional use. While Table Thirteen shows volitional objects preceding

TABLE FOURTEEN

Table of Spearman's Rank Order Coefficients for Acquisition Order Correlations between Greenfield and Smith and John Tracy Clinic Project.

	VERBAL	NONVERBAL	COMBINED
2-year-olds	0.385	0.370	0.355
3-year-olds	0.175	0.464	0.503
4-year-olds	0.367	0.046	0.276

objects, this does not mean we have found the opposite effect. First of all, the category indicative object, acquired after performatives, has been excluded from the Greenfield and Smith column. Secondly, one of our functions, locate/name, has also been excluded. This is because the two functions were not identical, but rather ours was broader. If these two functions are included, however, as roughly equivalent, then locate/name occurs between performative and action or state of an agent, and prior to volitional object. That is, it occurs in comparable rank to Greenfield and Smith's indicative object.

(2) Another trend which was noted in the Progress Report of August 1976 also appeared in our study, and this is the decrease with age in the number of imitations observed. Thus, two-year-olds produce 20.3% (45), three-year-olds 8.7% (47), and four-year-olds 4.4% (21) imitations (Table B). This is in accordance with what is known about hearing children (see Progress Report for August 1976, p. 23). Repetition, however, does not decrease as greatly.

(3) While labelling increased markedly with age as reported in August 1976, the increase is not quite as substantial (6.0% or 72, 6.1% or 33, and 11.2% or 54 for two, three, and four-year-olds respectively, versus the figures of 1 - 5 - 20 in August). We still find a significant increase in this behavior between ages three and four, while labelling predominates in the early (18-24 months) speech of hearing children (e.g. Nelson, 1976). The figures thus seem to reflect a delay in the use of this function of communication for hearing impaired children.

(4) While descriptions decidedly increased with age in August (3 - 16 - 24 for two, three, and four-year-olds, respectively), our findings do not show such decisive continuation of this trend, although it would be expected in the case of normal hearing children. While we do note an increase (6.5% to 13.8%) between two and four and an increase (6.3% to 13.8%) between three and four, the three-year-olds made use of the function description somewhat less than the others.

(5) It was reported in August that protesting occurred more often with the youngest children, although our studies show that all age groups use it to approximately the same extent, with the use slightly higher for three-year-olds (5.9%, 6.3%, and 5.8% for two, three, and four-year-olds respectively).

(6) Two-year-olds requested confirmation and/or acknowledgment more than the other children in both this study and the Progress Report; however, while the figures were 10 - 3 - 5 in August, we report 5.4% (24), 3.0% (16), and 5.0% (24), thus bringing two and four-year-olds a little closer together than before (but see below). Otherwise, use of this function is expected to decrease with age in hearing children (White, 1975).

(7) While only four-year-olds responded to a question in the previous study, it was believed this was both an artifact of the taping and the fact that adults rarely posed questions to young children. Our data confirm both suggestions: .7% (3) for two-year-olds, .5% (3) for three-year-olds, but 3.5% (18) for four-year-olds.

(8) Another presumed artifact of the data in the August report was the occurrence of 46 commands for three-year-olds, but none for two-year-olds, and only one for four-year-olds. While we exhibit the same trend, we do have occurrences of 1.6% (7), 12.0% (65), and 6.7% (32) commands for two, three, and four-year-olds, respectively. This large number for three-year-olds can be explained in part by the same child we had to take out of the initiated/response study because he caused data skewing (see Section VI.4.A). This particular child produced nearly 22% commands himself, and commands represent the function he uses most (followed by summons, at 15.5%). When he is removed, three-year-olds produce 27 or 5.0% commands, thus yielding a steady increase with age in use of commands.

(9) There is also some development with respect to the possible combinations of semantic and pragmatic categories produced by the children. Thus, while nearly every child can produce performatives corresponding to all pragmatic functions, three and four-year-olds are able to combine semantic functions in general with a wider variety of pragmatic functions than are two-year-olds. For example, two-year-olds combine negation with acknowledgment and repetition, but three-year-olds combine negation with acknowledgment, protesting and responding to a command, while four-year-olds combine this semantic function with six pragmatic functions: description, imitation, labelling, protesting, questioning, and response to a command. It is almost always the case that two-year-

olds are less able to utilize a wide range of pragmatic functions with a given semantic function than three and four-year-olds; however, four-year-olds are not always more capable at combining than three-year-olds. Hence, two-year-olds combine volitional object only with demand, and four-year-olds combine it with demand and summons, but three-year-olds outperform both groups and combine volitional object with five functions: demand, question, repetition, response to a command, and summons (cf. Table Fifteen).

(10) Protesting doesn't assume verbal form until age three, but even then it tends to be produced in a nonverbal act.

(11) Requests for approval are used infrequently and never verbally in our study, and their use increases with age (3 - 5 - 10 occurrences for two, three, and four-year-olds or .68%, .92%, and 2.08%, respectively).

(12) Requests for confirmation or acknowledgment are not produced verbally by two-year-olds nor are responses to commands or responses to summons.

(13) Older children who are able to verbally communicate more semantic and pragmatic functions tend to communicate more with their peers than younger and/or less communicative children.

(14) Four-year-olds and two-year-olds, often in our study, exhibited similar trends, leaving three-year-olds in a class by themselves. We attribute this effect to two causes. First, the study contains, as mentioned twice above, one extremely verbal three-year-old (DH) who in many cases outperforms not only other three-year-olds but even some four-year-olds.

A second reason, however, may be that three-year-olds in general frequently perform as well (and sometimes better) than some four-year-olds. For example, Maratsos (1976) found it necessary to divide his subject pool of three-and four-year-olds into three groups: three, low four, and high four, where the "low four" group scored with equal or somewhat lower accuracy than the three-year-olds on tests of definite/indefinite reference, but the "high four" group always performed with greater accuracy than the other groups (pp. 59-63). We may be experiencing a "low four" effect.

TABLE FIFTEEN

Number of Pragmatic Functions Combined with a Semantic Function Per Age Group

	AGE: TWO	THREE	FOUR
action/state agent	3	9	6
action/state object	2	3	2
agent	1	5	4
aspect	5	3	5
dative	1	2	2
locative	2	5	8
locate/name	5	6	6
negation	2	3	6
object	2	7	7
object associated with object or location	0	1	2
object associated with person	1	5	4
performative	15	14	14
volitional object	1	5	2

It has also been noted by NV. Smith (1973) and Brown (1973) among others, that children who have been successfully producing an adult form will later produce a form which is "over-generalized." For example, while Smith's son produced "caught" as the past tense of "catch" at age two years, four months, he said "catched" at age three years, seven months. Thus, some of our four-year-old lag may be the result of this same phenomenon occurring a few months later for our children, with respect to communicative functions.

VIII. Summary and Implications

1. Many of the findings reported in the August Progress Report continue to be meaningful. These are:

   (1) The number of communicative acts per minute which a child produces increases with age.

   (2) Performatives continue to constitute the largest class of semantic functions produced by our subjects. They are the first acquired, and are used in greater abundance for the younger children. This is also expected for hearing children.

   (3) The children in our study are not progressing similarly to hearing children with respect to the acquisition of verbal semantic functions, with the exception of performatives and indicative objects (or locate/name functions). They approach developmental norms a little more closely if their combined verbal and nonverbal behavior is taken into account, and compared to verbal normative data.

   (4) Many of the trends in pragmatic development reported in August 1976 were found to hold, although some to a lesser extent. In accordance with normative data, imitation decreases with age, descriptions tend to increase (variably), as does labelling. The children in our study also exhibit normal trends in that two-year-olds produce requests for confirmation or acknowledgment more, but we also have with respect to this function the "low four" effect discussed above.

   (5) In short, the hearing impaired subjects in our study are progressing more according to the norm for pragmatic functions than for semantic functions.

(6) Individual differences figure greatly in the study of our trends in acquisition of communication. At least part of the variation, but certainly not all, is due to the differing degrees to which hearing is impaired. Other kinds of variation appear in the degree to which an individual child communicates more with an adult or with peers.

(7) Degree of hearing loss and age of subject <u>together</u> predict fairly well the number of semantic and pragmatic functions a child will be able to express verbally, greater ability in communication appearing in older children with less severe hearing losses.

(8) Children who are severely or profoundly deaf tend to begin using verbal communication later than those whose hearing impairments are less severe.

2. Conclusions

There are two very strong conclusions which have implications for remediation and assessment programs. The first is that nonverbal, non-oral communication in hearing impaired children can be adequately assessed by determining the semantic and pragmatic content of these communicative behaviors. Secondly, verbal communication can not only be assessed as well using this approach, but what results is a more adequate assessment than that based on mean length of utterance alone. We have thus demonstrated the validity of the functional categories adapted from Dore (1973, 1974) and Greenfield and Smith (1976) for assessment of the communicative abilities of hearing impaired children, and demonstrated the appropriateness of such a functional approach.

A remediation-oriented suggestion is that it should be possible to actively teach children to utilize a given semantic function with a number of different communicative intentions (pragmatic functions). In teaching a given word, for example, it could be demonstrated that the word could be used in a number of ways: for answering a question or command, for asking a question, for calling someone, and so on. Later, a given word could also be taught in various semantic functions; for example, "John" can be taught as an agent in "John goes to school," as a volitional object in "John! Come here!", as a dative in "Give some juice to John," and so forth. In this way teachers may utilize learning which the children have already experienced - learning better understood through the present approach - to stimulate continued communicative development.

BIBLIOGRAPHY

Austin, J.L. (1962). How to do things with words. New York: Oxford University Press.

Bates, E., Camaioni L. & Volterra, V. (1975). The acquisition of performatives prior to speech. Merrill-Palmer Quarterly, 21:3.

Bloom, L. (1970). Language development: form and function in emerging grammars. Cambridge, Massachusetts: M.I.T. Press.

Bloom, L. (1973). One word at a time. The Hague: Mouton.

Brown, R. (1973). A first language: the early stages. Cambridge, Massachusetts: Harvard University Press.

Dore, J. (1973). The development of speech acts. Unpublished. Ph.D. dissertation, City University of New York.

Dore, J. (1974). Holophrases, speech acts, and language universals. Unpublished paper, City University of New York.

Fillmore, C. (1968). The case for case. In: Emmon Bach and Robert T. Harms (eds.) Universals in Linguistic Theory. New York: Holt, pp. 1-90.

Greenfield, P. & Smith, J. (1976). The structure of communication in early language development. New York: Academic Press.

Keenan & Schieffelin (1976). Topic as a discourse notion: a study of topic in the conversations of children and adults. In Charles N. Li (ed.) SUBJECT AND TOPIC. New York: Academic Press, pp. 335-384.

Kimura, Doreen (1976). The neural basis of language qua gesture. In: Whitaker and Whitaker (eds.), Studies in Neurolinguistics, Vol. 2. New York: Academic Press, pp. 145-156.

Maratsos, M. (1976). The use of definite and indefinite reference in young children. London: Cambridge University Press.

Nelson, K. (1976). "Early speech in its communicative context." Paper presented at the conference on early behavioral assessment of the communicative and cognitive abilities of the developmentally disabled, May 3-6.

Scollon, R. (1974). One child's language from one to two: the origins of construction. Ph.D. dissertation, University of Hawaii, Dept. of Linguistics. Published in University of Hawaii Working Papers in Linguistics, Vol. 6, No. 5, July - September.

Smith, N.V. (1973). The acquisition of phonology: a case study. London: Cambridge University Press.

Vetter, H. & Howell, R. (1971). Theories of language acquisition. Journal of Psycholinguistic Research. Vol. 1, No. 1, pp. 31-64.

White, B. (1975). The first three years of life. Englewood Cliffs, New Jersey: Prentice-Hall.